SOCIAL IMPACT ANALYSIS
OF
POTENTIAL GEOTHERMAL RESOURCE AREAS

Circular C-104

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Water and Land Development

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PREFACE

Act 296, Session Laws of Hawaii 1983, as amended by Act 151, SLH 1984, requires that the Board of Land and Natural Resources examine various factors when designating subzone areas for the exploration, development, and production of geothermal resources. These factors include potential for production, prospects for utilization, geologic hazards, social and environmental impacts, land use compatibility, and economic benefits. The Department of Land and Natural Resources has prepared a series of reports which addresses each of the subzone designation factors. This report analyzes the major social impacts associated with geothermal activities within potential geothermal areas.

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SUMMARY

This section on the social impact analysis of geothermal resource areas gives emphasis to people's perceptions, attitudes, and concerns regarding geothermal resource development and operation. Considerations are based primarily on a 20 Megawatt (MW) to 30 MW level of geothermal generation of electricity and are based on available public information.

Major social concerns considered are health aspects, noise aspects, lifestyle, culture and community setting, aesthetics, and community input. Also included is a review of the potential geothermal areas with respect to these factors of social concern. Two major community-wide survey studies mentioned below produced information relating to perceptions and concerns about the effects of geothermal development. In addition, inputs were made by community and other organizations and individuals on various occasions.

The Puna Community Survey, prepared in 1982 by SMS, Inc. for the State Department of Planning and Economic Development and the Hawaii County Department of Planning, reported that only one-fifth of the total survey respondents felt they had been affected by the geothermal wells in Puna, on the Hawaii Island. Much about the cultural background, beliefs, practices, and lifestyles of the Hawaiian residents in Puna was reported and discussed in the survey conducted by the Puna Hui Ohana, Assessment of Geothermal Development Impact on Aboriginal Hawaiians, with indications that there is a balance of respondent's views on the economic benefits of geothermal development versus the possible social/lifestyle or environmental costs of such development. Several major studies were recently completed on existing or ambient air quality levels and proper control of geothermal emissions.

If in the course of time, development considerations expand to higher output levels than 20 MW to 30 MW electricity production and to uses other than electricity generation, comprehensive studies and analyses will need to be made on the various social and community effects which may occur within a site-specific area.

Overall indications are that the elements of major social concerns and impacts could be minimized and preservation of quality environment could be achieved by proper siting, landscaping and design of plant facilities, and careful controls and monitoring of all operations. The necessity and desirability of furthering the on-going processes of accessing community input from all sectors should be emphasized.

SOCIAL CONCERNS, GENERALLY

Health Aspects

The health aspects of geothermal resource development involve primarily the effects of chemical, particulate, and trace element emissions on the physical environment and on residents in the vicinity. Hydrogen sulfide (H_2S) and sulfur dioxide (SO_2) are the major gaseous compounds concerned, but the naturally existing or ambient air of the volcanic regions also contains these compounds. The technical analyses of air/water quality are treated fully in the environmental impact analysis report, but the concerns and perceptions and attitudes of the residents regarding the health aspects of geothermal emissions are in the area of social concerns and sociological impact.

Two community-wide survey studies produced information relating to perceptions and concerns about the effects of geothermal development on elements of physical environment such as air quality. A community association in Puna, the Puna Hui Ohana, interviewed 351 Hawaiian residents in the Puna area, representing 255 families with a total population of 928 people, with results prepared in a report, Assessment of Geothermal Development Impact on Aboriginal Hawaiians (February 1, 1982). Among the questions surveyed was the following:

> Question No. 12. "What kind of change would geothermal development bring about on the physical environment (noise, air quality, visual environment) of Puna?"[1]

Summary of survey results [2]:

	Response Frequencies (No. of Responses)
Very Good	10
Good	16
Slightly Good	11
Neither Good Nor Bad	46
Slightly Bad	56
Very Bad	114

A survey study conducted by SMS Research, Inc. for the State Department of Planning and Economic Development and the Hawaii County Department of Planning, The Puna Community Survey, completed in April, 1982, interviewed 778 residents in the Puna area and among the questions asked was the following:

> Question No. 18 [3]: "Have you or members of your household been affected by those wells in any way? [Geothermal wells in Puna]."
>
> Only 18% of the respondents answered "yes" and 81% of the respondents answered "no", with 1% answering "Don't know".

Each sub-area of the Puna region showed a different proportion of "yes" and "no" responses, as follows [4]:

	"yes"	"no"	"don't know"
PUNA TOTAL	18%	81%	1%
Kapoho-Kalapana	43%	57%	0%
Pahoa	28%	72%	1%
Subdivisions (between Pahoa and Keaau)	14%	85%	1%
Keaau	4%	95%	1%
Kurtistown-Volcano	6%	93%	1%

The 18% who answered "yes" were asked, "In what ways were you affected?" [5], with mentions of negative effects of "health problems" and "smell" as follows:

Percent of Respondents Perceiving Negative Effects

	Health Problems	Smell
PUNA TOTAL	14%	71%
Kaphoho-Kalapana	38%	81%
Pahoa	8%	79%
Subdivions (between Pahoa and Keaau)	13%	58%
Keaau	0%	50%
Kurtistown-Volcano	8%	42%

(Note: percentages in these responses add to more than 100% because respondents could mention more than one type of impact)

In addition to the two major survey studies, inputs in terms of concerns, perceptions, and opinons were made by community associations and other organizations and individuals regarding the HGP-A well and the Kahauale'a Conservation District Use Application, but in the comprehensive consideration of the physical effects of geothermal development and operations on residents' health, the effects (and mitigation measures) of these activities on human health over and above the effects of natural vocanic area ambient conditions and over and above other ambient effects on health such as mold and fungi growth in the area, should be assessed. In the "Puna Speaks" case, where HGP-A shutdown was requested by Puna residents, the U.S. District Court Judge ruled that the plaintiffs did not prove their case in suit as no causation was established between the well emissions and alleged maladies.

Two major sources of information that help answer the questions and concerns are: The Revised Environmental Impact Statement for the Hawaii Geothermal Research Station Utilizing the HGP-A Well at Puna, Island of Hawaii, dated March, 1978 [6] and the Revised Environmental Impact Statement for the Kahauale'a Project dated June, 1982 [7]. These contain information and assessment of ambient air content and emission effects. In addition, two major recent sources of information that help answer the questions and concerns are: Environmental Baseline Survey, Kilauea East Rift, Puna and Ka'u Districts, County of Hawaii (Progress Report, October 7, 1983) [8], prepared for the Hawaii State Deparment of Planning and Economic Development by NEA, Inc., in which definitive additional information on ambient air composition was obtained; and Evaluation of BACT for Air Quality Impact of Potential Geothermal Development in Hawaii, January, 1984, prepared for the U.S. Environmental Protection Agency by Dames & Moore.

In its conclusions on the air quality impact of potential geothermal development in Hawaii, the Dames and Moore study reports the following, based on the Best Available Control Technology (BACT) for emission abatement:

"H_2S, particulate and trace element emission rates were all developed from data gathered at HGP-A and assuming the emission controls described above. EPA-developed air dispersion models were then used to estimate the impact of these pollutant emissions on ambient air quality. Based on these calculations, potential H_2S emissions during normal power plant operations for the development scenarios [25MW and 50MW] described in this report are well below the proposed Hawaii ambient air quality standard (HAAQS) for H_2S. However, H_2S emissions during well bleeding operations have the potential to exceed the proposed HAAQS. This potential can be eliminated by developing (and implementing) H_2S emissions control measures for use during well bleeding or by altering the assumed emission release characteristics of well bleeding activities.

"Calculations of potential particulate and trace element impacts on ambient air quality were also conducted as part of this study. These data indicate that the proposed project does not have the potential to exceed applicable ambient air quality guidelines for these compounds."[9]

In addition to the above studies, a survey has currently been conducted by the Hawaii State Department of Health, on the health status of the Puna population exposed to low levels of hydrogen sulfide and other geothermal effluents. The study surveyed some 135 households in the Leilani Estates representing 350 people and a "control" group of 179 households in the Hawaiian Beaches Estates, representing 604 people, the control population being similar in demographic characteristics to but not having the exposure to geothermal emissions as the Leilani Estates population. A series of close to thirty questions were asked concerning health backgrounds and conditions and problems. Survey data are being processed and analyzed and as of mid-May; results are expected in about two months.

Noise Aspects

Although noise levels associated with geothermal energy development and operation are comparable with those of industrial or electrical plants of similar size, plant construction and operation in a quiet rural area are a potential noise factor to be controlled and monitored. In terms of people's perceptions of and concerns with the noise factor, in addition to the questions and answers reported in the foregoing section on health aspects, where the Puna Hui Ohana asked

residents in Puna, "What kind of change would geothermal development bring about on the physical environment (noise, air quality, visual environment) of Puna", the SMS Puna Community Survey reported on the element of noise as a negative impact mentioned by the Puna residents surveyed.

Of the 18% who answered "yes" to the question of whether they or their household had been affectd by the wells in Puna in any way, 22% mentioned they were affected by "noise". In the Kapoho-Kalapana area the percentage mentioning noise was 38%, in Pahoa 22%, in the subdivisions between Pahoa and Keaau 16%, in Keaau 0%, and in Kurtistown-Volcano 8%. [10]

In May of 1981, the County of Hawaii Planning Department issued a set of Geothermal Noise Level Guidelines to provide proper control and monitoring of geothermal-related noise impacts with stricter standards than those prevailing for Oahu and state-wide, based on lower existing ambient noise levels for the Island of Hawaii. Because these guidelines answer directly to the noise concerns, they are presented in the following excerpts:

> "In granting Special Permits for the exploration and development of geothermal resources in the Puna District, the Planning Department and Commission found that there were potential adverse impacts to the surrounding area which may result from the geothermal operations. Consequently, stringent controls and conditions were attached to the respective permits. The Planning Commission assigned the Planning Director the primary responsibility for the monitoring and enforcing of these conditions.
>
> "In light of these responsibilities and the numerous noise related complaints received from residents of the Puna District concerning certain geothermal drilling operations, the Planning Department has developed the following guidelines to determine acceptable noise levels for both geothermal exploration and production.
>
> "These noise levels are intended to provide the Planning Director with the necessary guidance to review and assess geothermal operations on a case specific basis to determine whether a noise nuisance exists or not. Based on this review, should the Planning Director find that the acceptable noise levels are being exceeded and that the residents are being significantly adversely impacted by that noise, he can: (1) invoke more stringent noise mitigative

procedures and/or mitigative devices; or (2) cease further geothermal activity in accordance with the appropriate provisions of the Special Permits."

"Guidelines

In conjunction with the various acceptable noise standards and the factors specifically affecting the Puna environment, the Planning Department has developed the following noise level guidelines for geothermal activities:

"1. That the acceptable geothermal noise guidelines should be at a level which reasonably assures that the Environmental Protection Agency and U.S. Department of Housing and Urban Development criteria for acceptable indoor noise levels can be met."

"2. That the sound level measurements should take place at the affected residential receptors."

"3. That, in conjunction and appreciation of the other guidelines, the acceptable noise levels for geothermal development are as follows:

a. That a general noise level of 55 dBA during daytime and 45 dBA at night not be exceeded except as allowed under b. For the purposes of these guidelines, night is defined as the hours 7:00 p.m. and 7:00 a.m.;

b. That the allowable levels for impact noise be 10 dBA above the generally allowed noise level. However, in any event, the generally allowed noise level should not be exceeded more than 10% of the time within any 20 minute period;

c. That the noise level guidelines be applied at the existing residential receptors which may be impacted by the geothermal operation; and

d. That sound level measurements be conducted using standard procedures with sound level meters using 'A' weighting and 'slow' meter response unless otherwise stated.

"The guidelines for allowable geothermal noise levels are intended to provide an interim basis for assessing geothermal activities. As more information is obtained and a better understanding of both the noise levels and their impacts on the environment, and the climatic conditions affecting the Puna area, these guidelines should be amended."[11]

Lifestyles, Culture, and Community Setting

The lifestyle, culture and community setting or atmosphere of an area are very much inter-related and represent a major concern in terms of the effects of any introduced changes, especially when the changes may be in the direction of industrial development in a relatively rural setting. The Puna area has the most information and the input to-date on these aspects in relation to geothermal development may for the time being be applicable to an extent to other localities. Each community, however, will have its own unique background and perceptions and goals. Each community should in the process of considering geothermal resource development contribute its own input into the assessments.

Much about the cultural background, beliefs, practices, and lifestyles of the Hawaiian residents in Puna was reported and discussed in the survey by the Puna Hui Ohana, Assessment of Geothermal Development Impact on Aboriginal Hawaiians. Among many other considerations, the study reports the following:

> "Of particular interest in assessing the cultural impact of geothermal development is the extent to which the Community members engage in traditional subsistence activities which could be in conflict with geothermal use of the land. As attachment 6-8 indicates, there is reported a high frequency of such activities with a majority of the sample fishing (66%), shoreline collecting (62%) and food gathering (59%). The practice of gathering medicinal plants (48%), gathering maile (38%) and hunting (38%) are also quite common. While these activities are common for family use, their frequency for commercial use drops substantially. Fishing (11%) is the most common of these activities practiced commercially, with shoreline collecting (7%), food gathering (5%) and gathering maile (5%) less frequent. Very little gathering of medicinal plants (2%) or hunting (1%) is engaged in commercially.
>
> "The reported frequency of a number of traditional cultural activities is presented in Attachment 6-9. The most frequent of these practicies are the sharing or exchange of food (72%), preparation of traditional Hawaiian foods (60%), singing of traditional songs (59%), and the use of traditional herbs and medicines (56%). While these activities are engaged in quite regularly by the Puna Hawaiian Community, the use of the Hawaiian language is much less common. Attachment 6-10 describes the extent to which the language

is reported to be spoken and understood. The most common response was that a few words and phrases are spoken (51%) or understood (42%). Approximately 10% of the respondents report fluency in the Hawaiian language, while 5% say they do not speak it at all...

"The final set of questions on the survey asked for respondents' views of a number of traditional Hawaiian cultural values. Attachment 6-11 presents the distributions of responses to four cultural values in terms of both their importance and the frequency with which they appear in modern Hawaiian culture. "Aloha," "love of the land," "ohana" and "respect for Kupunas" were all considered very important and common or very common among modern Puna Hawaiians. The agreement in the reponses to these four values was larger than for any other cultural characteristic assessed by the survey, and reflects a virtual consensus among the adult members of the Hawaiian Community of Lower Puna. Of particular relevance to the issue of geothermal development is the question about "love of the land," which 97% of the sample felt important or very important and 87% felt to be common or very common.

"One of the survey questions discussed in the Chapter 10 on Community attitudes toward geothermal development asked respondents how they felt about the quality of life in Puna at the present time. Attachment 6-12 presents the distribution of responses to this item. On a seven point scale from happy to unhappy the large majority responded that they were happy with the present quality of life in Puna, while only 9.5% were unhappy and 8.6% were neither happy nor unhappy." [12]

On attitudes towards the effects of geothermal development, the survey reported the following:

"One of the most stable of the findings of the survey was that the Hawaiian Community of Lower Puna is quite satisfied with the present quality of life in their Community. How, then, is the appearance of geothermal development perceived by the Community? The second major point of agreement among the respondents to the survey was that the impact of such development would be 'large' in scale. However, a consensus about the desirability of these potentially large impacts was not so readily apparent.

"A large number of impacts were perceived as negative by the respondents; and only one, economic impact, was reported to be clearly positive. Yet the question asking about the 'overall' impact of geothermal development in Puna produced responses averaging in the "neither good nor bad"

> middle ground. There seems to be a balancing of the potential economic benefits of geothermal development with the environmental and social costs of development. As indicated earlier, the actual situation is not so much one of agreement that the effects are 'neither good nor bad' as it is a polarization of people at the two ends of the continuum. Some people seem to be weighting [Sic] the economic end of the balance, while other are weighting [Sic] the environmental and social end. This situation is not unique to the Puna Hawaiian Community, and has also been described among the residents of Lake County in the Geysers geothermal field in California (Vollintine & Weres, 1976)." [13]

In the SMS study, The Puna Community Survey, respondents asked to name the best things about life in Puna today cited a great variety of factors, with 49% of the factors or items mentioned being in the category of lack of population and development, e.g. country atmosphere, rural area, uncrowded, etc., and 40% of the factors cited in the category of physical environment, and 33% of the elements cited being in the social/lifestyle factors group.

The survey also reported that the greatest divergence among attitudinal responses was between the Keaau and Kapoho-Kalapana planning areas, Keaau residents being the most concerned with economic development and jobs while Kapoho-Kalapana respondents were "suspicious of it". This was analysed in the report to be a function of the uncertainties and anxieties among Keaau residents concerning the closing down of Puna Sugar Plantation, whereas Kapoho-Kalapana's current rural character would be more affected by geothermal-related activities. [14]

Consideration of lifestyles, culture, and community setting should include the factors of the multi-ethnic background of residents in these communities, the relative lack of magnitude of impact from the beginning phase of 20 Megawatt (MW) to 30 MW geothermal plant size, and the trade-off choices, if and when development should increase in scale, between the benefits of economics in the area and attendant raising of standards of living and educational opportunities, versus the costs of lifestyle and community changes. It may be possible that with careful consideration and intelligent input and planning, a favorable composite of these elements could be achieved and retained.

Aesthetic

Although in some areas with potential geothermal resource development the plant installation may be relatively unobtrusive--where scenic view corridors are not damaged in the eye of nearby or medium-distanced residents and visitors--consideration of aesthetic aspects should include careful siting, tasteful design, and effective landscaping.

The SMS study mentioned before, The Puna Community Survey, reported that of the negative impacts perceived relating to the geothermal well, 5% felt that it "looks bad". The area respondents with the greatest percentage of citing of the aesthetic aspect were Keaau residents, with 25% of the factors mentioned being under the category of negative appearance. [15]

Techniques of preserving aesthetic aspects of the landscape and natural vistas include attractive design, painting of structures and towers and plants with colors to blend in with the natural setting. A 20 MW to 30 MW plant complex might be given attention and care as a design model for any future expansion that may be considered desirable.

Community Input

Various channels and methods of community input are involved in the preliminary as well as future process of geothermal resource development evaluation and actualization. The community surveys by the Puna Hui Ohana and by SMS Research, Inc. for the State Department of Planning and Economic Development involved not only resident response, but also involved, in the Puna Hui Ohana survey, the work of many residents in formulating the survey, in conducting the survey, and in analysing and reporting the results.

In a study of geothermal socio-economic issues in the Hawaii Energy Resource Overviews, Volume 5, The Social and Economic Impacts of Geothermal Development in Hawaii., Dr. Penelope A. Canan, Assistant Professor of Sociology and Urban and Regional Planning at the University of Hawaii, suggested and discussed theoretical social

impact assessment and management models, the use of multi-disciplinary groups, "objective" and "subjective" social indicators, the inclusion of the planning process in community process models, and the prerequisite of site specification in social impacts assessment. [16]

Public informational meetings held by the State Department of Land and Natural Resources on May 8 and 9, 1984, and on May 29 and 30, 1984 on the Islands of Hawaii and Maui, encourage public participation, so that the planning process may include, in the preliminary stage as well as later on in the process, as much input as possible from the public.

Other sources and channels of community input include the planning processes, goals, objectives and development policies formulated and adopted in community plans that become a part of the County General Plans and the State General Plan and its input processes, as well as policies brought forth by representatives of people and communities in the State Legislature.

ASSESSMENT OF POTENTIAL RESOURCE AREAS

Social Impact Factors

Depending on the geographic location of the 20 MW to 30 MW geothermal operation, social concern factors may have varying significance. Possible social factors for consideration in geothermal area assessments are shown in Table 1. Current population magnitudes and selected socio-economic characteristics of communities in or near the geothermal resource areas are referenced in Table 2A and Table 2B. Relatively significant social factors in terms of their possible effects are highlighted in the following seven potential geothermal resource areas, of which five are on the Island of Hawaii and two are on the Island of Maui.

Table 1. POSSIBLE SOCIAL FACTORS FOR CONSIDERATION IN GEOTHERMAL RESOURCE AREAS

Geothermal Resource Area	Health Noise	Lifestyle Culture Community	Aesthetic (Natural Beauty)
HAWAII ISLAND			
1. Kilauea East Rift Zone	X	XX	X
2. Kilauea Southwest Rift Zone	X	XX	X
3. Mauna Loa Northeast Rift Zone	X	X	X
4. Mauna Loa Southwest Rift Zone	X	XX	X
5. Hualalai Northwest Rift Zone	X	XX	X
MAUI ISLAND			
6. Haleakala Southwest Rift Zone	X	XX	X
7. Heleakala East Rift Zone	X	XX	X

Source/Notation: Prepared for this report on potential geothermal resource areas based on social factors considered in this section, and given the 20 MW to 30 MW geothermal electricity production level, with no site specifics or locations within overall potential geothermal areas except for the HGP-A plant and the proposed Kahauale'a project in Puna in the Kilauea East Rift Zone area. X marks where factor may be significant in its potential effects; XX marks where factor may be relatively more significant in its potential effects for consideration.

Table 2A. HAWAII ISLAND SELECTED COMMUNITIES, 1980 Census

	Puna		Kau	North Kona	
	Census Tract 210 (Upper Puna)	Census Tract 211 (Lower Puna)	Census Tract 212	Census Tract 215	Census Tract 216 (Kailua)
Resident Population	7,055	4,696	3,699	7,610	6,138
Households	2,381	1,450	1,108	2,525	2,077
Median Age of Population	30.2	27.3	29.8	29.1	28.5
Family Income (in 1979):					
Median	$18,015	$13,843	$17,555	$22,261	$20,000
Mean	$28,075	$17,632	$18,412	$26,934	$22,400

Table 2B. MAUI ISLAND SELECTED COMMUNITIES, 1980 Census

	Kula/Makena		Kihei	Hana
	Census Tract 303.01*	Census Tract 303.02**	Census Tract 307	Census Tract 301
Resident Population	3,850	1,277	6,020	1,423
Households	1,317	474	2,103	435
Median Age of Population	30.7	33.4	29.1	28.0
Family Income:				
Median	$25,850	$26,571	$22,049	$16,906
Mean	$28,161	$34,917	$24,788	$17,570

Source: 1980 U.S. Census of Population and Housing, Census Tracts, Hawaii Selected Areas. PHC 80-2-13.

* Upper Kula
** Makena

Kilauea East Rift Zone, Hawaii

In this area on the Island of Hawaii, the primary significant factor would be in terms of lifestyle, culture, and community setting as they are experienced in Puna, although given the level of geothermal operation of 20 MW to 30 MW electricity production, with an addition of some 25 workers involved directly (and brought in from the outside) as estimated in the economic assessment section, the potential effects should not be great. (The Upper Puna area had a count of 7,055 residents in 2,381 households, and the Lower Puna area had a count of 4,696 residents in 1,450 households in the 1980 U.S. Census.) As discussed in the economic assessment, the housing situation may be somewhat affected; and the small magnitude of change in lifestyle and social inter-action that may be brought about by new residents may be a small part of the lifestyle, culture and community and traffic changes already taking place in the area as a result of the influx of new residents in recent years. Although air and water quality and noise factors should be considered, they could be controlled and monitored; also important is the preservation of natural beauty and aesthetics, which could be achieved by well-planned siting, landscaping, and well-designed plant architecture.

Kilauea Southwest Rift Zone, Hawaii

In this area on the Island of Hawaii, the primary significant social factor would be in terms of lifestyle, culture, and community setting as they are experienced by the people in Ka'u, although given the level of geothermal operation of 20 MW to 30 MW, the potential effects should not be great.

The Ka'u district had a count of 3,699 residents and 1,180 households in the 1980 U.S. Census. In the economic assessment the housing stock in this area is estimated to be sufficient to satisfy the housing demand resulting from a 20 MW to 30 MW geothermal plant being located within the district. The health and noise factors are important depending on where in the region a plant is located, but as discussed before, the air/water quality and the noise factor should be controlled and monitored. A portion of Ka'u is encompassed by the Hawaii

Volcanoes National Park, and the preservation of natural heritage and natural beauty is an important factor. Good aesthetics may be achieved by well planned siting, landscaping, and well designed plant architecture for geothermal activities nearby.

Mauna Loa Northeast Rift Zone, Hawaii

This zone encompasses primarily the people in the Upper Puna area, whose lifestyle and community setting may be somewhat less rural than that of the coastal Puna area, with a signficant portion of the residents having jobs in Hilo and vicinity. The air/water quality, noise factor, and aesthetics should, as mentioned before, be controlled and monitored.

Mauna Loa Southwest Rift Zone, Hawaii

This zone encompasses the southern portion of the Ka'u area, with generally similar factors for social consideration as discussed in the section the Kilauea Southwest Rift Zone.

Hualalai Northwest Rift Zone, Hawaii

In this area on the Island of Hawaii the primary significant social factor may be in terms of lifestyle, culture, and community setting as they are experienced by the people of North Kona, although this area has experienced much growth in recent years and is exposed to the presence of resort operations and the influx of visitors from metropolitan areas in many parts of the world. In 1980 Kailua, Kona had a count of 6,138 residents, with 2,077 households, and the rest of the North Kona area had a count of 7,610 residents, with 2,525 households. In the economic assessment of geothermal activities in this rift zone, the potential increase of households should not pose a significant problem barring any major change in the housing market. The elements of air/water quality, noise, and aesthetics are all important considerations for this area. The preservation of a quality environment should be achievable by careful control and monitoring of any emissions, effluents and noise, and with well planned siting, landscaping, and well designed plant complexes.

Haleakala Southwest Rift Zone, Maui

This rift zone encompasses a portion of the coastal Makena area of southwest Maui Island and a portion of the upper Kula area (Ulupalakua). The Makena area had a count of 1,277 residents with 474 households, with the of the Upper Kula area reporting 3,850 residents and 1,317 households in the 1980 U.S. Census. Recent resort development has occurred in the Kihei-Makena coastal area, introducing additional lifestyle and cultural elements into the general area. The potential effects on lifestyle, culture, and community introduced by geothermal production activities should be considered but in terms of a 20 MW to 30 MW level should not be great. The control and monitoring of air/water quality and noise elements should be achievable. The preservation of the natural scenic beauty of the area, especially Upper Kula, should be a significant consideration and may be achievable by careful site selection, landscaping and aesthetic facility designs.

Haleakala East Rift Zone, Maui

The community of Hana is in this rift zone in east Maui, with a 1980 U.S. Census count of 1,423 residents and 435 households. This community is rural/pastoral with agricultural and resort lifestyles, and the primary significant social impact may be in terms of lifestyle, culture, and community setting. Given the level of geothermal operation of a 20 MW to 30 MW plant, there may be an impact. With a potential addition of some 25 geothermal workers, there may occur a shortage of housing units in the area. Depending on where in the region a geothermal plant might be located, the control and monitoring of air and water quality and noise elements would be significant. The preservation of natural beauty in this area would be an important consideration. Some preliminary environmental baseline studies are being made for the Haleakala East Rift Zone area.

ADDITIONAL CONSIDERATIONS

It has been assumed that a geothermal plant would produce 20 MW to 30 MW of electricity. If in the course of time, development considerations expand to higher levels of output, with site-specific locations, further comprehensive and detailed studies and analyses of specific long-term and large-magnitude impacts will need to be made. Direct-use application of geothermal power such as in food processing, desalination process, and for spas and other uses may aid in diversifying the activities base of the communities and stimulating diversified agriculture and aquaculture.

In a study by the State Department of Planning and Economic Development and the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, The Feasibility and Potential Impact of Managanese Nodule Processing in the Puna and Kohala Districts of Hawaii, it was pointed out that one of the likely eventual social impacts of such industrial activity would be better schooling, with eventual improvements in social services and community facilities. The study also pointed out that efforts to mitigate the impacts of any industrial development in a rural area may not altogether prevent a minimal deterioration of the natural environment, with increased traffic and more congestion, possibly with less social cohesion. However, the study also pointed out that it is possible that less social cohesion may be desirable for facilitation of community and economic progress; also that on the other hand community social and economic progress may be enhanced and increased, with high-technology jobs serving to keep the technically educated young workers from having to leave Hawaii in search of employment, thus helping to keep families together and to increase social cohesion [17].

REFERENCE NOTES

1. Puna Hui Ohana, Assessment of Geothermal Development Impact on Aboriginal Hawaiians, p.149.

2. Ibid. p.164.

3. SMS Research, Inc. The Puna Community Survey Volume II: Detailed Results, p. 95.

4. Ibid. p. 95.

5. Ibid. p. 96.

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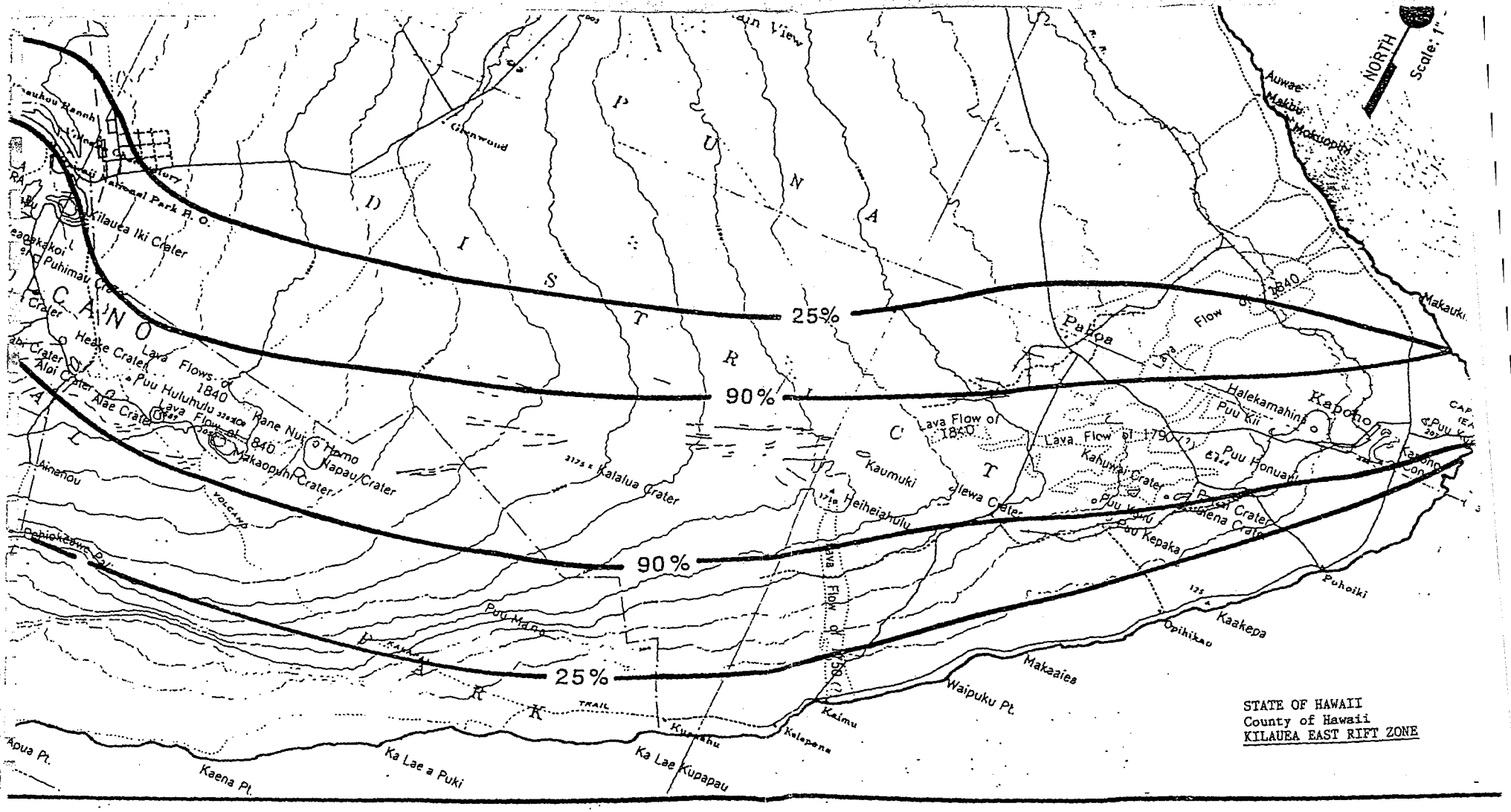

STATE OF HAWAII
County of Hawaii
KILAUEA EAST RIFT ZONE